

Amendment After Final Action Under 37 C.F.R. 1.116

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Dated: January 3, 2011 (the 2nd falling on a Sunday)
Electronic Signature for Darcey L. Jacobs: /Darcey L. Jacobs/

Docket No.: 66969-0004
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Thomas Pullen et al.

Application No.: 10/562,804

Confirmation No.: 6079

Filed: May 19, 2008

Art Unit: 1735

For: HOLLOW SHAFT WITH AT LEAST ONE
BALANCING WEIGHT, AND PROCESS FOR
PRODUCING IT

Examiner: E. B. Saad

RESPONSE TO FINAL OFFICE ACTION

MS AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INTRODUCTORY COMMENTS

In response to the Final Office Action dated November 2, 2010, rejecting claims 1, 19-20, and 22-31, please amend the above-identified U.S. patent application as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 4 of this paper.

AMENDMENTS TO THE CLAIMS

1. (Currently Amended) A process for fixing at least one balancing weight to at least one location on a hollow shaft, for torque transmission at rotational speeds in the range of 3000 rpm to 12000 rpm in a drive system for a vehicle, comprising securing the at least one balancing weight to the at least one location by soldering without a shielding gas, wherein one of a tin-based and zinc-based flux-free solder with a soldered tensile strength greater than 100 N/mm² is applied as a foil.

2-18. (Cancelled)

19. (Previously Presented) A process according to Claim 1, wherein the at least one balancing weight is secured by soft soldering.

20. (Previously Presented) A process according to Claim 19, wherein the hollow shaft, at the at least one location, does not exceed a maximum temperature of 450°C during soldering.

21. (Cancelled)

22. (Previously Presented) A process according to Claim 1, wherein the soldering step at the at least one location lasts no longer than 3 seconds.

23. (Previously Presented) A process according to Claim 20, wherein the soldering step at the at least one location lasts no longer than 3 seconds.

24. (Previously Presented) A process according to Claim 1, wherein the soldering step at the at least one location lasts no longer than 3 seconds.

25. (Previously Presented) A process according to Claim 1, wherein during soldering, a joining force of less than 2000 Newton is exerted on the at least one balancing weight towards the hollow shaft.

26. (Previously Presented) A process according to Claim 20, wherein during soldering, a joining force of less than 2000 Newton is exerted on the at least one balancing weight towards the hollow shaft.

27. (Previously Presented) A process according to Claim 1, wherein the at least one balancing weight is first provided with solder material and, thereafter, fixed to the hollow shaft.

28. (Previously Presented) A process according to Claim 27, wherein a plurality of balancing weights are fixed, and at least in some cases, different quantities of solder material are provided at the balancing weights.

29. (Previously Presented) A process according to Claim 1, wherein at least one of the following heat sources is used for the soldering step: inductor, convector.

30. (Previously Presented) A process according to Claim 1, wherein at least a balancing of the hollow shaft and the soldering of the at least one balancing weight are carried out on a single machine.

31. (Currently Amended) A process for fixing at least one balancing weight to at least one location on a hollow shaft, for torque transmission at rotational speeds in the range of 3000 rpm to 12000 rpm in a drive system for a vehicle, comprising securing the at least one balancing weight to the at least one location by brazing without a shielding gas, wherein one of a tin-based and zinc based flux-free solder with a soldered tensile strength greater than 100 N/mm² is used.

REMARKS

The Applicants have carefully reviewed the Final Office Action mailed November 2, 2010 and thank Examiner Saad for her detailed review of the pending claims. In response to the Office Action, Applicants have amended claims 1 and 31. Support for the amendments to claims 1 and 31 may be found at least in Paragraphs [0020] and [0045] of the application. No new matter has been added. Accordingly, claims 1 and 19-20, and 22-31 remain pending in this application.

At least for the reasons set forth below, Applicants respectfully traverse the foregoing rejections. Further, Applicants believe that there are also reasons other than those set forth below why the pending claims are patentable, and reserves the right to set forth those reasons, and to argue for the patentability of claims not explicitly addressed herein, in future papers. Further, for any instances in which the Examiner took Official Notice in the Office Action, Applicants expressly do not acquiesce to the taking of Official Notice, and respectfully request that the Examiner provide an affidavit to support the Official Notice taken in the next Office Action, as required by 37 CFR 1.104(d)(2) and MPEP § 2144.03.

Applicants respectfully request reconsideration of the present application in view of the above amendment and the following remarks.

Claim Rejection – 35 U.S.C. § 103

- Lürenbaum (DE725619) in view of Myers (U.S. Patent No. 6,811,633), and Holland (U.S. Patent No. 5,139,704)**

Claims 1, 19-28, 30, and 31 were rejected under 35 U.S.C. 103(a) as being unpatentable over Lürenbaum in view of Myers and Holland. Applicants respectfully traverse the rejection.

Independent Claim 1

Hollow Shaft

Independent claim 1 recites “[a] process for fixing at least one balancing weight to at least one location on a hollow shaft, for torque transmission at rotational speeds in the range of 3000 rpm to 12000 rpm in a drive system for a vehicle, comprising securing the at least one balancing weight to the at least one location by soldering without a shielding gas, wherein one of a tin-based and zinc based flux-free solder with a soldered tensile strength greater than 100 N/mm² is applied as a foil.” Lürenbaum, alone or in reasonable combination with Myers and Holland, fails to teach, suggest, or disclose every recitation of claim 1.

“To establish *prima facie* obviousness of a claimed invention, all the claim recitations must be taught or suggested by the prior art.” *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). M.P.E.P. § 2143.03. *Accord.* M.P.E.P. § 706.02(j). The Examiner admitted that “Lürenbaum does not specifically state that the shaft is hollow” and, therefore relied on Myers to teach joining balancing weights to a hollow driveshaft. Thus, the Examiner argues that “it would have been obvious to use the method of soldering balancing weights of Lürenbaum to balance the hollow driveshaft of Myers.” (*See* Office Action, p. 2). Applicants respectfully disagree with this position.

Lürenbaum is directed toward balancing unbalanced shafts. According to a machine translation of the text of Lürenbaum, to balance the shafts, imbalance masses are welded on in the form of a sheet metal on the shaft body, which can be soldered or glued. (*See* translation, lines 1-3.) Further, Lürenbaum suggests that gluing balancing sheets on the shaft achieves a higher fatigue strength in the adhesion joint, than, for example, soft soldering can reach, thereby teaching away from the desirability of soldering. Indeed, Lürenbaum teaches that since the fatigue strength of the shaft does not become affected by gluing as with soldering, particular advantages then can be achieved. (*See* translation, lines 11-13.)

In the Office Action, the Examiner noted that “Lürenbaum discloses soldering balancing weights to a shaft. Lürenbaum was silent to the shaft being hollow.” Thus, the Examiner used Myers “as a secondary reference to show that it is well known to attach balancing weights to a hollow shaft.” (*See* Office Action, p. 8). However, as discussed in more detail below, Myers

teaches that an adhesive material is used to secure a balance weight to a drive shaft, not a soldering process.

Indeed, as illustrated in FIG. 2 of Myers, reproduced below, Myers teaches that an adhesive material is applied to the outer surface of the driveshaft section 17, the inner surface 44 of the balance weight 40, or both. When the balance weight 40 is pressed against the driveshaft section 17, a first portion of the adhesive material is extruded outwardly and a second portion is extruded upwardly. The first and second extruded portions are then exposed to an accelerated curing process in order to temporarily secure the balance weight 40 to the driveshaft section 17. (See Col. 5, lines 36-50). However, nowhere does Myers disclose soldering the balancing weight 40 to the driveshaft section 17.

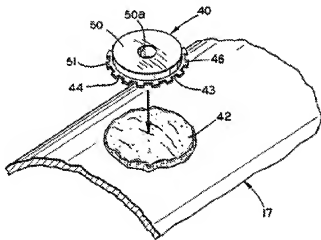


FIG. 2

In fact, not only does Myers fail to disclose soldering balance weight 40 onto the driveshaft section 17, it also teaches away from causing undesirable localized heating of the driveshaft when securing the balancing weight 40 to the driveshaft section 17. More specifically, Myers discloses that “ultraviolet radiation is a preferred accelerated curing process because it does not cause undesirable localized heating of the driveshaft.” Therefore, it would not have been obvious to combine the method of soldering balancing weights disclosed in Lürenbaum to balance the hollow

driveshaft of Myers, especially as even Lürenbaum recognizes that soldering can compromise the fatigue strength.

Even if Lürenbaum discloses “soldering balancing weights to a shaft,” the use of Myers “as a secondary reference to show that it is well known to attach balancing weights to a hollowing shaft” is improper because Myers expressly teaches the use of an adhesive material to secure a balance weight. Moreover, Myers teaches away from causing undesirable localized heating of the driveshaft when securing a balancing weight, which soldering would necessarily impart. Therefore, the combination of Lürenbaum which discloses the particular advantages of adhesives while teaching away from the desirability of soldering and Myers which is directed to use of an adhesive material to secure a balance weight to a drive shaft does not teach “securing the at least one balancing weight to the at least one location by soldering.”

Accordingly, the combination of Lürenbaum and Myers does not teach, at least, “[a] process for fixing at least one balancing weight to at least one location on a hollow shaft...comprising securing the at least one balancing weight to the at least one location by soldering” within the context of claim 1. Holland also fails to make up for this inadequacy. Indeed, Holland fails to teach joining balancing weights to a hollow driveshaft. Thus, independent claim 1 is patentable over Lürenbaum in view of Myers and Holland. Applicants respectfully request withdrawal of the rejection.

Tensile Strength

Independent claim 1, as amended, also recites in part, “securing the at least one balancing weight to the at least one location by soldering without a shielding gas, wherein one of a tin-based and zinc-based flux-free solder with a soldered tensile strength greater than 100 N/mm² is applied as a foil.” Lürenbaum, alone or in combination with Myers and Holland, fails to teach, suggest, or disclose at least this recitation of claim 1.

Holland is directed to a fluxless solder for application to metal surfaces, wherein the solder includes additives which remove contaminating oxides during the soldering process. (See Col. 2, lines 44-51). In the specification, Holland discloses use of a solder alloy comprising tin and lead that is alloyed with a reducing agent like lithium, calcium, strontium, or cesium. (Col. 2, lines 21-

24). However, Holland fails to teach, suggest or disclose “one of a tin-based and zinc-based flux-free solder with a soldered tensile strength greater than 100 N/mm².”

Myers also fails to cure at least this deficiency of Holland. That is, Myers fails to teach, suggest, or disclose, at least, “one of a tin-based and zinc-based flux-free solder with a soldered tensile strength greater than 100 N/mm².” Indeed, as discussed above, Myers discloses the use of an adhesive material applied to the outer surface of the driveshaft section 17, the inner surface 44 of the balance weight 40, or both.

Lürenbaum also fails to cure at least this deficiency of Holland and Myers. Lürenbaum is directed toward balancing unbalanced shafts. According to a machine translation of the text of Lürenbaum, to balance the shafts, imbalance masses are welded on in the form of a sheet metal on the shaft body, which can be soldered or glued. (See translation, lines 1-3.) However, Lürenbaum is silent regarding the specific solder used. Therefore, Lürenbaum fails to teach, suggest, or disclose “one of a tin-based and zinc-based flux-free solder with a soldered tensile strength greater than 100 N/mm².”

Accordingly, Lürenbaum, alone or in combination with Myers and Holland, fails to teach, suggest, or disclose at least this recitation of claim 1. Therefore, independent claim 1 is patentable over Lürenbaum in view of Myers and Holland. Applicants respectfully request withdrawal of the rejection.

Shielding Gas

Independent claim 1 also recites, in part “securing the at least one balancing weight to the at least one location by soldering without a shielding gas.” Lürenbaum, alone or in reasonable combination with Myers and Holland, fails to teach, suggest, or disclose at least this recitation of claim 1.

As an initial matter, the Examiner admitted that Lürenbaum “does not specifically state using a shielding gas for the soldering process.” Nonetheless, the Examiner took the position that a shielding gas is not being used. (See Office Action p. 9). This argument is insufficient to establish a *prima facie* case of obviousness. The Examiner must establish that all of the claim recitations are taught or suggested in the prior art. To meet this burden, the Examiner cannot interpret

Lürenbaum's silence on the use of a shielding gas as verification that Lürenbaum discloses soldering without the use of a shielding gas. The Examiner must show that "securing the at least one balancing weight to the at least one location by soldering without a shielding gas" is taught or suggested in the prior art.

Myers fails to cure at least this deficiency of Lürenbaum. As previously discussed, Myers teaches an adhesive material applied to the outer surface of the driveshaft section 17, the inner surface 44 of the balance weight 40, or both. However, Myers is not directed toward soldering nor does Myers disclose a soldering process. Therefore, Myers fails to teach, suggest, or disclose "securing the at least one balancing weight to the at least one location by soldering without a shielding gas."

Accordingly, the Examiner relied on Holland to disclose "that the fluxless solder may be used in a vacuum atmosphere," on the basis that "[t]his would indicate that no gas is present during the soldering process." (See Office Action p. 9). However, as disclosed in the specification of the present application, the claimed process is advantageous because the soldering process is very short which allows for in-line production, i.e. the component does not have to be removed from the production flow or balancing process. (Paragraph [0027]). Moreover, as disclosed in dependent claim 31, "at least a balancing of the hollow shaft and the soldering of the at least one balancing weight are carried out on a single machine." Thus, applying a vacuum atmosphere would require incorporating a vacuum chamber into the process in which the shaft would be placed. This would lead to higher production costs and would entail a much larger technical outlay than applying a shielding gas to the soldering operation. No motivation exists for combining Lürenbaum with Myers and Holland in this manner.

Accordingly, Lürenbaum, alone or in combination with Myers and Holland, fails to teach, suggest, or disclose at least this recitation of claim 1. Therefore, independent claim 1 is patentable over Lürenbaum in view of Myers and Holland. Applicants respectfully request that the rejection of the claim be withdrawn.

Dependent Claims 19-20 and 22-27

Dependent claims 19-20 and 22-27 are patentable at least by virtue of their direct or indirect dependence on patentable independent claim 1. Accordingly, withdrawal of the rejection is respectfully requested.

Independent Claim 31

Independent claim 31 has been amended to recite, in part, “securing the at least one balancing weight to the at least one location by brazing without a shielding gas, wherein one of a tin-based and zinc based flux-free solder with a soldered tensile strength greater than 100 N/mm² is used.” Lürenbaum, alone or in combination with Myers and Holland, also fail to teach, suggest, or disclose at least this recitation of claim 31. The arguments presented above with respect to claim 1 are equally applicable here. Therefore, independent claim 31 is patentable over Lürenbaum in view of Myers and Holland. Applicants respectfully request that the rejection of the claim be withdrawn.

2. Lürenbaum (DE725619 Myers, Holland, and Porter (U.S. Patent No. 2,914,942)

Claim 29 was rejected under 35 U.S.C. 103(a) as being unpatentable over Lürenbaum, Myers, and Holland, and in further view of Porter.

Dependent claim 29 is directly dependent on independent claim 1. The remarks presented above with respect to the combination of Lürenbaum, Myers, and Holland are equally applicable here. Indeed, Porter also fails to disclose “securing the at least one balancing weight to the at least one location by soldering without a shielding gas, wherein one of a tin-based and zinc-based flux-free solder with a soldered tensile strength greater than 100 N/mm² is applied as a foil.” Accordingly, Porter fails to cure at least this deficiency of Lürenbaum, Myers, and Holland

Therefore, dependent claim 29 is patentable at least by virtue of its dependence on independent claim 1. Accordingly, withdrawal of the rejection is respectfully requested.

CONCLUSION

Reconsideration and allowance of the claims as presented are respectfully requested. In view of the above amendments and remarks, Applicants believe the pending application is in condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to allowance.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 18-0013, under Order No. 66969-0004 from which the undersigned is authorized to draw.

Dated: January 3, 2011

Respectfully submitted,

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